APPLICATION FOR UNITED STATES PATENT

FOR

APPARATUS AND METHOD TO ENHANCE MOTOR VEHICLE SAFETY

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Related U. S. Application(s)

This application is a continuation of U.S. application serial no. 09/259,430, filed March 1, 1999, for an invention by Gotauco. U.S. application serial no. 09/259,430 is hereby incorporated herein by reference.

Technical Field

The present invention relates to motor vehicle safety enhancement and, more specifically, to safety enhancers which may not be prematurely disabled. In particular, a stimulator to rouse a sleepy motor vehicle driver which cannot be disabled without turning the motor off is described.

Background Art

Many motor vehicle safety enhancement devices have been developed. The effectiveness of most, if not all, such devices may easily be compromised by actions of those whom the devices are intended to protect. For example, seat belts must be fastened if they are to protect a user from sudden deceleration and impact. Seat belts should not be unbuckled until the vehicle is safe and, usually, stopped. Emergency flashers should not be prematurely deactivated.

Falling asleep while operating a motor vehicle remains a major cause of personal injury and property damage. The consequences of falling asleep are more widespread than those experienced by the motor vehicle operator. In particular, delivery and trucking companies would benefit from reduced liability insurance costs if devices were effective to reduce or eliminate the chance of their drivers causing harm to themselves, others, and their valuable cargo.

Summary of the Invention

Embodiments of the present invention provide motor vehicle safety enhancement devices which, once activated, may not be prematurely deactivated.

In an embodiment, an electrically controllable safety device for use by an occupant of a motor vehicle includes a safety enhancer and a controller. The controller and the safety enhancer are electrically coupled to the vehicle's electrical ignition system, so that the controller may only activate the safety enhancer while the motor is on and, once activated, the safety enhancer may only be deactivated by turning the motor off.

In another embodiment, a stimulator for use by a sleepy driver of a vehicle includes a signal generator capable of rousing the driver and a controller to activate the signal generator. The controller and the signal generator are electrically coupled to a motor vehicle ignition system, so that the controller may only activate the signal generator while the motor is on and, once activated, the signal generator may only be deactivated by turning the motor off. The signal generator may include a buzzer and a warning lamp. The controller may include a momentary switch, a relay, and a diode.

In yet another embodiment, an electrically controllable safety device for use by an occupant of a vehicle is provided. The vehicle is powered by a motor activatable by an electrical ignition system which includes an ignition switch having an ignition pole electrically coupled with a power source and an ignition throw electrically coupled with a motor starting means. The device includes a manually activatable switch having a switch pole and a switch throw with the switch pole electrically coupled to the ignition throw. The device also has a changeover relay with two input terminals, a plurality of output terminals, an inductor, and a relay switch. The first input terminal is externally electrically coupled to the ignition throw and is internally electrically coupled to a relay pole of the relay switch. The second input terminal is externally electrically coupled to the switch throw and internally electrically coupled to a first inductor end while a second inductor end is internally electrically coupled to a first output terminal which is externally coupled to ground. An electrical connection is included between the second input terminal and an active output terminal of the changeover relay and a safety enhancer is externally electrically coupled to the

active output terminal. Turning the manually activatable switch on while the ignition switch is on instantaneously powers the inductor causing the relay switch to switch positions from a first position coupled to an inactive throw, which is internally electrically coupled to an inactive output terminal, to a second position coupled to an active throw internally electrically coupled to the active output terminal coupled to the safety enhancer so that, in addition to flow to the enhancer, current from the electrical ignition system flows through the inductor to keep the inductor powered.

Methods of using such electrically controllable safety devices are provided in further embodiments of the present invention.

Brief Description of the Drawings

Fig. 1 is a flow diagram illustrating the operation of a motor vehicle safety enhancement device in accordance with an embodiment of the invention.

Fig. 2 is an electrical circuit diagram for a stimulator in accordance with an embodiment of the present invention.

Detailed Description of Specific Embodiments

Fig. 1 shows how a motor vehicle safety enhancement device **10**, in accordance with an embodiment of the invention, would be operated. Device **10** includes a safety enhancer **11** and a controller **12**. Examples of safety enhancers include a stimulator described below as well as safety belts and their associated couplings and emergency flashing lights. Use of and design of other safety enhancers not specifically mentioned, when controlled in the manner disclosed below, are made without departing from the spirit and the scope of the present invention. The device **10** is activatable only after the vehicle ignition system **1** is turned on and the motor **2** is, ostensibly, running. Access to an accessible portion **13** of controller **12** is provided so that the moment at which the safety enhancer **11** may be activated is controlled by the driver or passenger. Theoretically, remote access to controller **11** could be provided using RF generation and reception or other forms of contactless activation eliminating involvement by the driver or passenger. Accessible portion **13** may include a simple toggle

switch, a momentary switch, or may, within the scope of the present invention, be non-mechanical. It may be voice-actuated or otherwise turned on by stimuli known in the art of electrical switching. Controller **12** may, preferably, include other unaccessible components. The operator of an accessible portion **13** of controller **12** may turn safety enhancer **11** on; an analogous attempt to turn off the safety enhancer **11** will fail as safety enhancer **11** is electrically coupled with the vehicle ignition system **1** so that safety enhancer **11** may only be deactivated by shutting the motor **2** off by shutting off system **1**. Once the accessible portion **13** is on (with system **1** on), it is, effectively, eliminated from the circuit and cannot be used to defeat safety enhancer **11**. Thus, it is the combination of system **1**, the accessible portion **13**, and any unaccessible portion which make up the controller **12**. A practical advantage of using a momentary switch for the accessible portion **13** is that such a switch will not continue to close the circuit after manual or other release by the operator. If a toggle or other type of switch were used, the operator might, inadvertently, leave the switch on after the vehicle were safely stopped. The safety enhancement device **10** would, in such a situation, disadvantageously reactivate immediately after system **1** was restarted.

Device **10** may, for example, stimulate a sleepy driver, enhance the safety of seat belts, or control other accessories or systems. Fig. 2 is a circuit diagram for a stimulator **100** for rousing a sleepy motor vehicle driver. The diagram includes dashed lines surrounding subelements of stimulator **100**. Vehicle ignition system **1** is represented by ignition switch **20** electrically coupled at ignition pole **22** with a power source **21** for powering motor **2** and other devices. Ignition throw **23** is electrically coupled to both an input terminal **30** of changeover relay **3** (path **B**) and, downstream, to switch pole **24** of manually activatable switch **130**. Switch **130** represents the accessible portion **13** of the controller **12**, while relay **3** is an unaccessible portion of controller **12**. While motor **2** is running (and ignition switch **20**) are on, a driver or passenger may activate switch **130**. When the connection between switch pole **24** and switch throw **25** is made, current may flow through path **A** into relay input terminal **86**. Prior to and after activation of path **A**, current flows through path **B** to relay pole **33** of relay switch **40**. Prior to activation of path **A**, relay switch **40**, shown as single pole, double throw, couples relay pole **33** with first throw **34**. First throw **34** is internally

electrically coupled to inactive output terminal **87A**. Activation of path **A**, allows current to flow from relay input terminal **86** into a winding (comprised of inductor **31** coupled in parallel with resistor **32**) and out of relay **3** at output terminal **85** to ground **37**. The effect is to turn inductor **31** on, thereby switching relay switch **40** so that, as long as inductor **31** is on, relay switch **40** remains in a position coupling relay pole **33** to second throw **35**. This is the origin of the designation of this type of relay **3** as a changeover relay. Safety enhancer **11** (in this case, buzzer **4** and warning lamp **5**) are powered while relay switch **40** remains in this position as the circuit between second throw **35** and active relay output terminal **87** remains complete. An electrical connection is included between relay input terminal **86** and active relay output terminal **87** upstream from buzzer **4** and warning lamp **5**. Preferably, a diode **36**, is placed in this connection path to protect these relatively high current lines impeding flow back through relay switch **40**. This electrical connection through diode **36** maintains inductor **31** in the on state when switch **130** is turned off. Current no longer need pass through path **A**, relay switch **40** remains in position, and buzzer **4** and warning lamp **5** remain powered until ignition switch **20** is opened. When ignition switch **20** is opened, flow through path **B** stops, inductor **31** shuts off, and relay switch **40** shifts to its first position coupling relay pole **33** to first (inactive) throw **34**, in turn, opening the circuit to buzzer **4** and warning lamp **5**. For example, if accessible switch **130** is a spring-loaded momentary switch, inductor **31** remains powered after contact between pole **24** and throw **25** is lost. This illustrates a benefit of using a momentary switch **130** in that an operator may easily leave switch **130** on, causing buzzer **4** and warning lamp **5** to turn on upon restart of ignition system **1**.

For example, a motor vehicle driver notices that he is becoming sleepy while driving. The driver activates a switch readily accessible to him. It may be mounted on or near the dashboard. It may be a push button, lighted momentary switch. Once activated, buzzer **4** and warning lamp **5** become active, rousing the driver. He, then, has a chance to safely pull the vehicle off the road. Buzzer **4** and warning lamp **5** remain active until the ignition system **1** is turned off. The circuit diagram of Fig. 2 may, while remaining within the scope of the present invention, be modified to include activation of other safety enhancers which may not be

prematurely disabled. Other safety enhancers, such as seat belt controls and emergency flashers, may be so included in the safety enhancement device **10**.

Accessible switch **130** may preferably be a lighted momentary switch found in many electronic supply venues. Relay **3** may be a 12 volt, 20/30 ampere rated model for which a Bosch No. 0-332-209-150 is well suited. Electrical relays are commonly used in conjunction with motor vehicle accessories which draw relatively large amperage. Within the framework of the vehicle's overall electrical system, if accessories draw an inordinate amount of current, resultant undesirable voltage drops can compromise other system functions. Reference numbers **30, 85, 86, 87,** and **87A** are the numerals actually used on this particular changeover relay. Diode **36** may be general purpose (e.g. an NTE116 silicon) rectifier having a maximum peak surge forward current rating of 30 amperes. Buzzer **4** may be a 6-16 volt DC, 100 decibel piezobuzzer (e.g. Radio Shack No. 273-070). Warning lamp **5** should be 12 volt DC.

Although the invention has been described with reference to several preferred embodiments, it will be understood by one of ordinary skill in the art that various modifications can be made without departing from the spirit and the scope of the invention, as set forth in the claims hereinbelow.